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Operation Castle

R.A. Meade

On February 28, 1954, Bravo, the first of six thermonuclear devices tested during Operation Castle, burst into the sky over Bikini Atoll.¹ In an instant, and unexpectedly, Bravo became the highest yield device tested by the United States. Romeo, Koon, Union, Yankee, and Nectar followed. Each, with the exception of Koon, performed better than predicted, providing the United States with stable, deliverable thermonuclear weapons, albeit ones still very large and cumbersome.² The overall success of Castle, however, had a downside. Bravo's fallout injured Marshallese natives and contaminated a Japanese fishing trawler. The international uproar that followed ultimately led to the cessation of atmospheric testing.

As Bravo's mushroom cloud streaked toward the stratosphere, its radioactive wave swept over Bikini's islands with the force of a major hurricane. Trapped by radioactivity, the firing party, located thirty miles from ground zero, became seasick as their concrete bunker rolled and swayed like a ship at sea.³ Five minutes after detonation, Bravo's mushroom cloud punched through the stratosphere topping out at 115,000 feet. At ten minutes, the cloud was more than seventy-five miles wide and still expanding. Unexpectedly, high levels of radioactivity fell throughout the Marshallese Archipelago forcing the emergency evacuations of Rongerik, Rongelap, and Utirik Atolls.⁴

¹ March 1st, in the United States.

² Hewlett, *Atoms for Peace and War*, 165.

³ Bernard O'Keefe, *Nuclear Hostages*, 189-196.

⁴ One of the oddest occurrences of any test operation occurred when Bravo's fallout contaminated two work camps on Bikini. The work crews of these two camps were moved to ships for Bravo expecting to return to their camps after three days. Since their stay on ships was to be brief, they were ordered to leave most of their belongings in camp. Bravo, of course, contaminated everything left behind, including clothing. Restitution was slow in coming. No one, it was determined, had the authority to make restitution. Only after Bradbury insisted, was restitution made – but only if each worker submitted a detailed list of lost clothing. Even as millions of dollars was being spent



Bravo Test Site



Bravo Device in Shot Cab

conducting Operation Castle without qualm, the anxiety about reimbursing a few hundred dollars for clothing reached all the way back to Washington, D.C.



Bravo



Bikini Work Camp prior to Bravo



Bikini Work Camp after Bravo

None of the devices tested at Castle were part of the original plan. That plan, drafted shortly after Greenhouse, called for a test series consisting of only fission devices. Very soon,

however, a number of issues coalesced, fundamentally changing Castle beginning with the realization that Mike, although not yet tested, could not be a weapon of war. It was too big. Requiring a much smaller version for its Air Force bombers, the Joint Chiefs of Staff called “upon the Commission to produce a thermonuclear weapon in the megaton range that would be compatible with delivery systems to be available in 1954.”⁵ In addition to being too big, Mike had a second major problem, its cryogenic design made stockpiling nearly impossible. Nonetheless, Los Alamos was confident that it could produce one or more devices to meet the JCS request, now codified as the Emergency Capability Program.

As the Los Alamos program proceeded to develop cryogenic devices, research suggested an alternative - a cheaper, more efficient dry fuel. Harold Agnew and Hans Bethe proposed shifting the focus of Los Alamos research to such designs in 1953.⁶ They were successful. The revised Castle plan now included both such thermonuclear designs, three of which were intended to meet the ECP mandate. The University of California Radiation Laboratory also influenced Castle. The UCRL had two thermonuclear designs of its own waiting to be tested. Very quickly, then, the focus of Castle changed from fission to thermonuclear testing.

Bravo’s mushroom cloud provided immediate and spectacular evidence of technical success. Agnew quickly sent a cleverly written message back to Los Alamos saying, “Why buy a cow when powdered milk is so cheap?” His message was clear: Bravo marked the end of cryogenic thermonuclear designs, including the cancellation of the planned second Castle test.

⁵ Hewlett, 163; and H. D. Smyth to K. E. Fields, January 2, 1953.

⁶ H. M. Agnew and H. A. Bethe to N. E. Bradbury, LANL Archives, August 19, 1953. Twenty-five years later, Agnew told Secretary of Energy James Schlesinger that the memo could have cost him his job, saying, “I authored it and if I hadn’t been clever enough to have had Bethe sign it, I would have been fired,” because it challenged the existing thermonuclear program. H. M. Agnew to Dr. James R. Schlesinger, April 6, 1978.

After a lengthy delay caused by Bravo's fallout, Romeo was detonated on a barge in Bikini's lagoon. Barge shots reduced the amount of fallout and protected the limited land mass of both Bikini and Enewetak Atolls.



Romeo

The UCRL conducted its first thermonuclear test, Koon, on April 6th. An unexpected design flaw kept the device from reaching at least a megaton yield, making it a failure. The UCRL cancelled the second of its planned tests, because its follow-on device was similar in

design. Union, Yankee, and Nectar completed the Castle test series. All three exceeded yield expectations.



Union



Yankee

Operation Castle has two competing legacies. The first legacy is the collective technical success of the Los Alamos devices. The door opened to further improvements successfully tested in the next series, Redwing. The second legacy is the worldwide concern that remains today about radioactive fallout. Bravo's fallout, in particular, was an alarm bell alerting the world to

existence of widespread and indiscriminate fallout. This concern led, ultimately, to the cessation of atmospheric testing.

Operation Castle: Bikini-Enewetak Atolls, February 1954 – May 1954

Codename	Date	Laboratory	Atoll	Venue	Yield (Mt)
Bravo	02/28/1954	LASL	Bikini	Surface	15
Romeo	03/26/1954	LASL	Bikini	Barge	11
Koon	04/06/1954	UCRL	Bikini	Surface	0.11
Union	04/25/1954	LASL	Bikini	Barge	6.9
Yankee	05/04/1954	LASL	Bikini	Barge	13.5
Nectar	05/13/1954	LASL	Enewetak	Barge	1.69